

AIRCRAFT CIRCULARS
NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 17

THE AVRO "AVIAN" AIRPLANE
65 HP. Armstrong-Siddeley "Genet" Engine

From "Flight," August 26, 1926

Washington
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THE AVRO "AVIAN" AIRPLANE.

65 HP. Armstrong-Siddeley "Genet" Engine.

The Avro "Avian" designed by Mr. Chadwick of the A. V. Roe & Co., Ltd., is characterized as having a very low structural weight and a great load-carrying capacity while, with future production in mind, the detail construction is of the simplest imaginable form without departing radically from normal practice. Although very accurate figures are not as yet available, the estimated empty weight is around 750 lb., and the total weight loaded is well within the airworthiness certificate, being more than double that figure.

The power loading for taking-off purposes is reduced to just over 21 lb./HP. in the use of an Armstrong-Siddeley "Genet" engine which develops a maximum of 75 HP.

A ratio of empty weight to total loaded weight of less than 0.5 is, of course, extraordinarily good, and indicates very great care in detail design. Lest it should be thought by those not intimately acquainted with Avro standards of construction that such a ratio necessarily means a flimsy structure, we would point out that the factors of safety are such that the airplane will be eligible for the "aerobatics" airworthiness certificate of the British Air Ministry, which fact may be accepted as sufficient

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proof of the strength of the airplane.

Before turning our attention to the details of the construction of the Avro "Avian," it may be of interest to mention briefly that the airplane will be produced in three distinct forms. First, there is the standard form, possibly with wings of somewhat smaller area than those used in competitions. For any one wanting a faster airplane than the normal, the "Avian" will be supplied as a low-wing monoplane, with a single strut bracing the wing to the top of the fuselage, as shown in Fig. 2. Finally, the airplane will be "put on floats," when it will have the normal biplane wings. This form also is shown in Fig. 2. It will thus be seen that the Avro "Avian" should prove a low-powered airplane with many applications and suitable, by some very simple substitutions, for a variety of uses. The detail construction is such as to make for cheap production, and it is intended to market the "Avian" at a price which should appeal strongly not only to light airplane clubs, but also to private owners.

Constructional Features

A close inspection of the details of the construction leaves one with the feeling that the designer had made up his mind at the start that every member was to be as simple and as light as possible, and that such few metal fittings as are used should be of a form that could be produced at an absolute minimum of cost.

sticks, mounted on two longitudinal beams resting on the floor of the cockpits. Hinged pedals are employed, which are pivoted to the actual transverse bars in such a way that they do not alter their angle, thus avoiding any risk of the feet slipping off. Metal troughs on the floor guard the floor boards against wear by the heels of the occupants. Two fore and aft longerons carry the seats.

The Wings

The wings of the "Avian" biplane are of large area, having a span of 32 ft., and a chord of 4 ft. 9 in. In spite of the large span there is but one pair of interplane struts on each side, so that the length of unsupported spars is considerable. The main spars themselves are of spruce, routed out to an I section (Fig. 4), this form of construction being cheaper, in labor costs, than a built-up box spar, while the small over-all size does not call for spruce planks of prohibitive cost. In order to make all ribs alike square wing tips are employed. In this country one does not usually find square wing tips, but on the other hand, the French Farman airplanes all have this form of tips with, apparently, no serious effect on efficiency. At any rate, at the speeds which the "Avian" is meant to attain there is probably little lost, while the cost is very much reduced. The ribs are of simple type, the construction being illustrated in Fig. 4. Owing to the parallel wings all the ribs are alike, those in the lower wing which fall in front of the ailerons be-

ing the standard, but with the trailing edge cut off and used as ailerons. All wing fittings are of very simple type, including the fittings for the interplane struts, top center-section struts, etc. Ailerons are fitted to the bottom wing only, this arrangement having the double advantage that in the biplane form of the airplane the ailerons are easily accessible, while the change-over to low-wing monoplane does not necessitate any interference with the normal controls. Special cranks giving a differential movement to the ailerons are used, and take the form shown in Fig. 3. Needless to say, the wings are made to fold, and the hinges used for this operation are like all the rest of the fittings, of the simplest possible type.

Landing Gear

The landing gear is of simple Vee type, with rubber blocks in compression forming the shock absorbing medium. The landing gear is extremely light for the loaded weight of the airplane. No definite figures are available, but when picked up the landing gear appeared to weigh but 5 or 4 pounds. The tail skid is similar to that used in the Avro "Avis," but an addition to it has been made in the form of a small detachable roller (Fig. 3), the purpose of which is to enable the airplane to be wheeled, with wings folded, without the necessity of a man struggling with the tail, which is necessarily heavy with the wings folded.

Power Plant

The Armstrong-Siddley "Genet" engine is mounted on an extremely light engine plate of duralumin, the form and details of which are shown in Fig. 3. Owing to the fact that most of the engine accessories in the "Genet" are placed in front, there is little need to get at the back of the engine, although the engine plate used enables this to be done with great ease if necessary. As the gasoline tank is in the top fairing, direct gravity feed can be used, with consequent simplicity of the fuel system. For competitions the "Genet" is fitted with a single magneto, as the addition of a second would bring the total weight up to more than the 170 lb. Dual ignition will be fitted as standard, the necessary provision for this having been made in the engine.

The main dimensions of the Avro "Avian" biplane are shown in the general arrangement drawings (Fig. 1). As previously stated, the weight empty is in the neighborhood of 750 lb., while the total loaded weight is approximately 1580 lb. Concerning performance, no information can be given for obvious reasons, but in spite of its large area the "Avian" is a clean design and should do well.

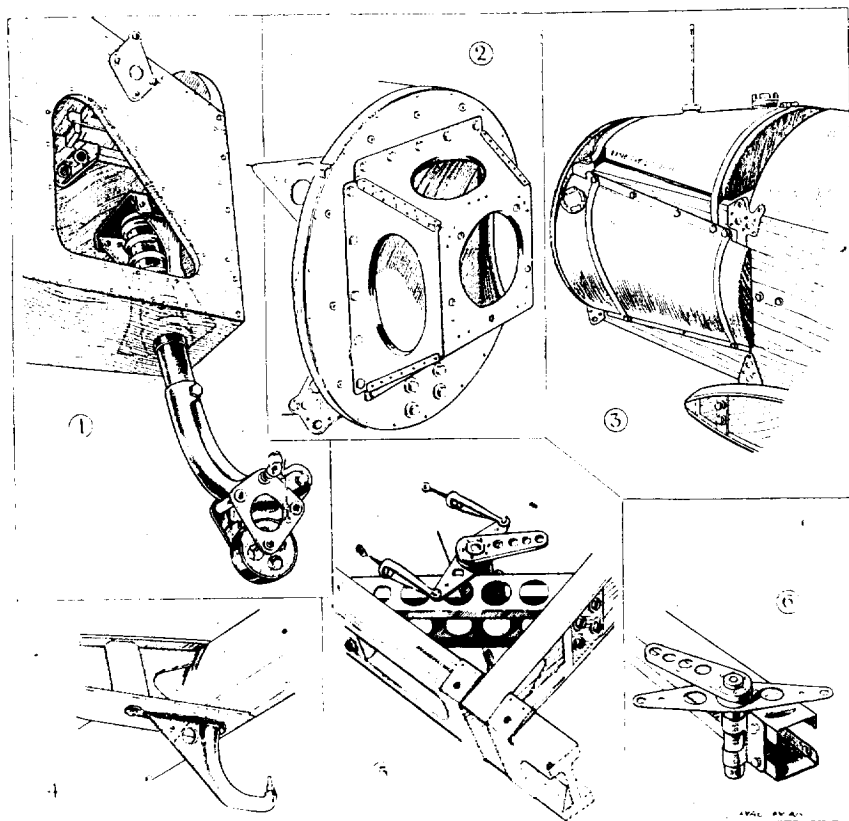


Fig. 3 Details of the Avro "Avian" airplane. 1, shows the tail skid with its small detachable roller, while the very light engine mounting is shown in detail in 2. The gasoline and oil tanks are mounted on the top and side respectively of the fuselage as indicated in 3. The aileron crank lever is illustrated in 4 and the differential aileron controls in 5 and 6

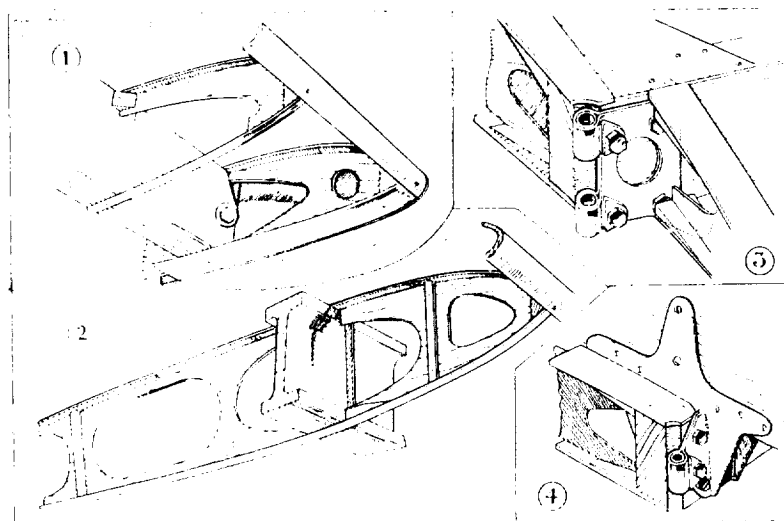


Fig. 4 Details of the Avro "Avian" airplane. 1, shows the very simple rib construction and leading edge, while in 2 is shown a complete rib, the spar section, and the leading edge. The hinges for folding the wings are of simple type, as shown in 3, with ample bearing areas. The wing root on the fuselage, with steel-plate fitting and hinge, is shown in 4.

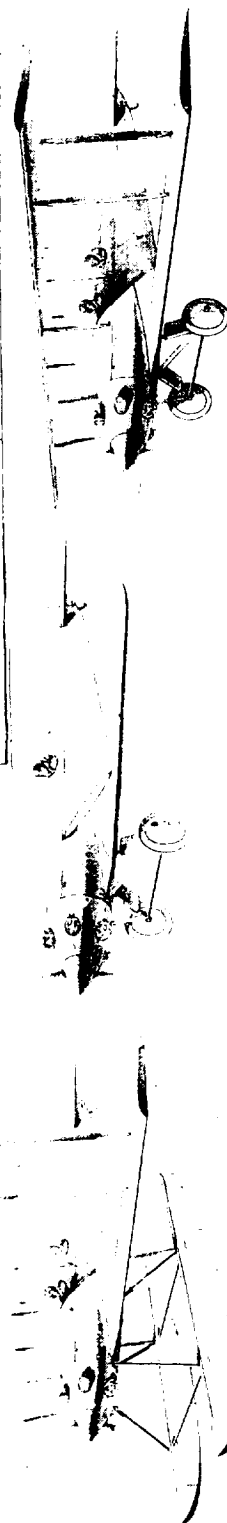


Fig. 2 The Avro "Avian" airplane in three forms with the new Armstrong-Siddeley "Genet" engine.

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